known. One obvious difference between the survey areas was the high numbers of lemmings present in July 1985 and the extremely low number apparently present (none counted) in July 1986. Likely, high numbers and widespread distribution of lemmings accounted for the commonness of Snowy Owls throughout much of the survey area in 1985 compared to 1961. However, lemming populations can be asynchronous on adjacent islands. For example in summer 1958 lemmings were abundant (approx. $\frac{1}{50}$ m^2), and so were Snowy Owls on Prince of Wales Island, while no lemmings or owls could be found on Somerset Island 40 km away (T. W. Barry, pers. comm.). Absence of lemmings on the July 1986 survey area could account for the difference in Snowy Owl numbers in 1961 vs. 1986.

Unfortunately, I have no knowledge of what proportion of the surveyed area in each year was suitable nesting habitat or what proportion of the owls seen were associated with nests. In general plant cover is relatively sparse on the western half of Prince Patrick Island, the northern tip of Eglinton Island, and the southern end of Lougheed Island compared to the remainder of the areas surveyed in 1985 and 1986.

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A NEW METHOD TO SELECTIVELY CAPTURE ADULT TERRITORIAL SEA-EAGLES

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Adult eagles are difficult to capture in their territory or breeding range. In northern Australia adult territorial White-bellied Sea-eagles (*Haliaeetus leucogaster*) were often attracted to capture sites but usually perched and watched from nearby. However, some came to bait but only after non-target birds had disturbed the trap. Therefore, a new, manually-operated, single-noose system was developed and compared with trapping success of three conventional methods (i.e., cage traps, cannon netting and eagle-triggered multi-noose systems). The new capture system requires a concealed hide (e.g., a camouflaged vehicle) located 200 m from the bait. One operator remains at the hide while another prepares the capture system. A capture site (approx. 2 m^2) clear of debris and vegetation is chosen well within an eagle's territory and in view of the hide. Bait (normal fish prey) is aligned such that the head is facing away from the hide and secured with two 300 × 10 mm steel pegs (Fig. 1). Alignment is important because eagles usually grasp the bait lengthwise with both feet, and the noose when sprung easily snares the eagle's legs from the side; otherwise the noose may slide up the back of the eagle.

Vegetation is cleared next to the hide, and one end of a 5 m length of 10 mm surgical tubing with a loop tied at each end is pegged to the ground next to the hide entrance. The other end is stretched and pegged beyond the hide (Fig. 1). A fishing reel (120 mm dia) bolted to flat steel (300 × 50 × 8 mm thick) is placed on the ground next to the tubing at the farthest point from the bait (Fig. 1a). The reel held 250 m of 18 kg monofilament line and

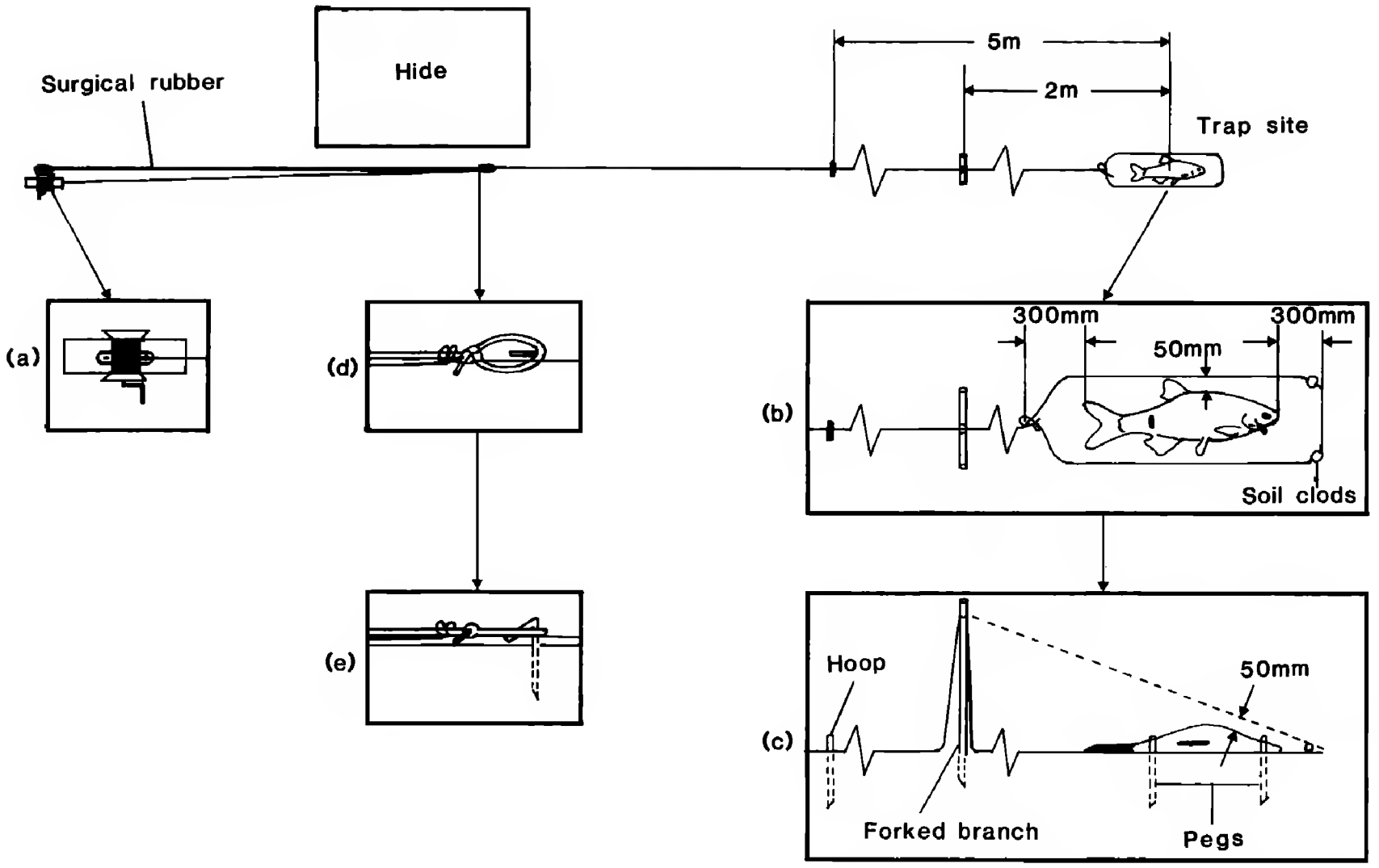

Figure 1. Diagram (not to scale) of manually-operated single-noose system. (a) enlarged plan view of reel; (b) enlarged plan view of capture site; (c) enlarged side view of capture site to illustrate the angle of line pull; (d, e) enlarged views of trigger mechanism.

2.5 m of 18 kg black, plastic-coated, trace wire to form a pre-prepared noose using a running slip knot (Jenkins, M. A., *N. Am. Bird Band.* 4(3):108–109, 1979). Trace wire is multi-stranded and lays flat on the ground compared to monofilament line and is thus less likely to be disturbed by non-target animals. The noose is carefully placed around the bait so that the free end is 300 mm in front of the head of the bait and held at two corners with small clumps of soil (Fig. 1b). Sides of the noose are placed 50 mm from and parallel to the bait, and a running slip knot is placed flat on the ground 300 mm behind the tail of the bait directly in line with the hide. A small forked branch, approximately 18 mm dia × 750 mm length, is pushed into the ground 2 m from the center of the noose area, and the monofilament line lays through the fork. Fork height is adjusted so that the closest point of an imaginary line from the fork to the free end of the noose is about 50 mm above the front of the bait (Fig. 1c), which prevents the noose from snagging on the bait. Line is lightly held close to the base of the branch with small pieces of twig as is the remainder of the noose to minimize disturbance by non-target animals. Combined weight of twigs does not exceed that of soil clumps; otherwise the line will pull along the ground and become entangled with the bait. A steel hoop was pegged across the main line about 5 m from the bait to prevent a captured bird from rising with the line attached.

At the hide the monofilament line is tied behind the knot in the bait end of the tubing using a clove hitch knot, and the peg holding the tubing is lifted slightly and turned 180° to allow the tubing to slip off easily when pulled upwards (Fig. 1d, e). The system is operated from the hide using a piece of 4 mm fencing wire bent 90° at one end and looped to form a handle at the other. The bent end is placed under the tubing just behind the front peg so that when pulled up the tubing is released from the peg which also pulls the line and causes the noose to quickly tighten around an eagle's legs. Attempts to escape further tightens the noose and injury is minimized by the elasticity of the tubing. A captured bird is easily subdued with a hand-held catching net.

When the system is ready, the person at the bait end moves to a concealed position well away from both the trap site and the hide in an attempt to deceive eagles that the area has been vacated; radio contact is maintained with the operator in the hide. Other birds, especially Black Kites (*Milvus migrans*) and Whistling Kites (*Haliastur sphenurus*), often gather and alight on or near the bait often causing a target eagle to attempt to pick up the bait or to scatter other birds. In either case the eagle usually returns

Table 1. Comparative capture success for White-bellied Sea-eagles using four capture methods.

Method	No. Trap-Days		No. Eagles Captured		% Success[a]		
						Target Eagles	
	Total	Within Territory[b]	Total[c]	Target Eagles[d]	All Eagles	Total	Within Territory
Manually-operated single-noose system	13	6	5	4	0.38	0.31	0.67
Eagle-triggered multi-noose system[e]	17	9	1	1	0.06	0.06	0.11
Cannon net[f]	19	16	14	1	0.74	0.05	0.06
Cage trap[g]	56	15	4	0	0.07	0	0

[a] No. per trap-day.
[b] Excludes trap-days when eagles not seen or sites disturbed by non-target animals.
[c] Juveniles, target and transient adults.
[d] Adults which maintained a fixed year-long territory.
[e] Modeled after Wegner, W. A., *J. Wildl. Manage.* 45(1):248–250, 1980.
[f] See Addy, C. E., U.S. Fish and Wildl. Serv., Laurel, MD, 164 pp., 1956.
[g] Cage traps (3 × 2 × 2 m high) were positioned for three months and baited for an average of four days. Together such a trapping attempt constituted one trap-day.

quickly and lands on or near the bait. Once an eagle is standing on the bait and feeding, the operator waits until the eagle lifts its head and only then triggers the system.

In this study target eagles were adults which maintained fixed year-long territories rather than transient adults or juveniles. Significantly more target eagles were captured with the manually-operated noose system than with the eagle-triggered noose system ($P < 0.05$), cannon netting ($P < 0.01$) or cage traps ($P < 0.01$) (Fisher Exact Probability Test, Table 1). Capture success for all eagles (i.e., target, adult transient, juvenile) using the manually-operated noose system was also significantly greater than that using the eagle-triggered noose system ($P < 0.05$) and cage traps ($P < 0.01$), but not for cannon netting.

Baited cage traps are commonly used to capture birds (Day et al., Wildlife management techniques manual, 4th Ed. The Wildl. Soc., Washington, DC, 1980) and need little modification for raptors. In northern Australia cage traps have been used successfully in capturing Black Kites and Whistling Kites (A. Hertog, unpubl.; J. Estbergs, pers. comm.), but not White-bellied Sea-eagles. In 56 trap-days in areas where eagles were known to frequent, only four were captured (seven percent success) and none were target eagles. Cannon netting was very successful for juvenile and adult transient eagles with a 74% capture success in 19 trap-days. Only one target eagle was captured in 16 trap-days (six percent success). Although attracted to the vicinity of the trap site, target eagles tended to be wary of the net which was difficult to conceal.

An eagle-triggered noose system was set 17 times but only one target eagle was captured (six percent success). Failure was due to disturbance to the noose by eagles (N = 3) or capture/disturbance by Whistling Kites (N = 5). Even when those disturbance data were excluded from results capture success was still poor (11%).

In 13 trap-days five eagles were captured (38% success) using my new, manually-operated capture system, and two were missed because the trap was triggered prematurely by the operator. Other failures were due to the absence of adults at the trap site (N = 3) and disturbance at the trap site by mammals and reptiles. Excluding these data, capture success was 67% for four target eagles. Apart from being superior to other conventional trapping methods, my system has the advantages of being inexpensive, quickly set up, and easily concealed. In addition birds can be selectively captured (i.e., specific sex, age, status, species) thus making the technique useful in studies with other raptors.

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